Acquisition

reform

week III

Performance-based spares Procurement

Facilitator Guide

Acquisition Reform Week III
Performance-Based Spares Procurement

Scope of Seminar

This seminar addresses the application of Performance Specifications and best value source techniques to reduce overall ownership and support costs of spares and items traditionally procured with “Build-to-Print” Technical Design Packages (TDPs). The technique of using Performance Specifications combined with "for information only" TDPs is presented. That approach gives the contractor more options and flexibility, which can translate into reduced cost, and/or improved reliability, maintainability and supportability. *

Instructions to Facilitators

Each Acquisition Reform Week III seminar takes approximately one and one-half hours to complete. To maximize the potential for participants to gain an overall understanding of the subject, we suggest you hand out presentation materials 2-to-24 hours in advance. If participants read the information before the seminar, the facilitator can conduct a brief recap and then devote a significant portion of the time to practical experiences - including the exercise at the end of the lecture, which demonstrates the principles outlined in the presentation.

As Facilitator you will need a copy of the full package which is detailed below. Participants should receive item #2 in advance, if possible. Item #3 should be handed out in the seminar. Items #1 and #4 are for the exclusive use of the Facilitator.

Included in this file are the following:

TIP: Print pages in the order noted so you will have one complete package. Then, duplicate individual sections as needed depending on number of participants. This will ensure materials are in correct order and will reduce the risk of the file being too large for computer or printer equipment to handle with ease.

Main Teaching Points

These are the three main teaching points in this seminar. Before proceeding to the exercise, make sure participants understand the following:

1. The concept of performance specifications, and how they are used in best value source selections.

2. Be able to outline the basic steps in the conversion of TDPs to performance specifications.

3. Be able to describe the basic steps in the process of preparing a solicitation with performance specifications for spares procurement.

*This seminar was tailored from materials used in the 2 ½ day Roadshow VI Workshop, developed and presented by the BRTRC Institute for HQ Army Materiel Command. For more information please contact (703) 205-1593, or visit our website at: http://institute.brtrc.com.

Overview and Presentation for Participants

Acquisition Reform Week III
Performance-Based Spares Procurement

Overview
Welcome to the Acquisition Reform Week III seminar, Performance-Based Spares Procurement (PBSP). This session is designed to help participants do the following:

1. Understand the concept of performance specifications, and how they are used in best value source selections.
2. Be able to outline the basic steps in the conversion of TDPs to performance specifications.
3. Be able to describe the basic steps in the process of preparing a solicitation with performance specifications for spares procurement.

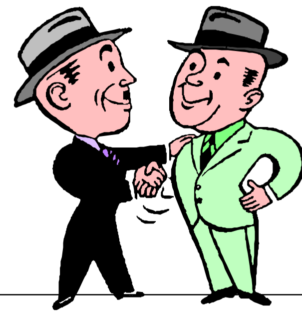
Exercise Objective
Participants will be asked to complete the Performance SPEC Model form using the detailed specifications which have been provided. Completion of this task should involve an assessment of the item's Interface and User Needs, Environmental, Support and Ownership requirements, as well as a clear understanding of Performance Specifications and their impact on the acquisition of spares.

Instructions to Participants
Please review the presentation. Be prepared to ask questions and/or participate in a brief recap. This will be followed by an exercise designed to test your understanding of the principles captured in the presentation material and offer a hands-on experience in dealing with Performance-Based Spares Procurement.

Performance-Based Spares Contracting

Acquisition Reform WEEK III

Performance-based Contracts with Performance Specifications



Spares Rebuys Replenishments

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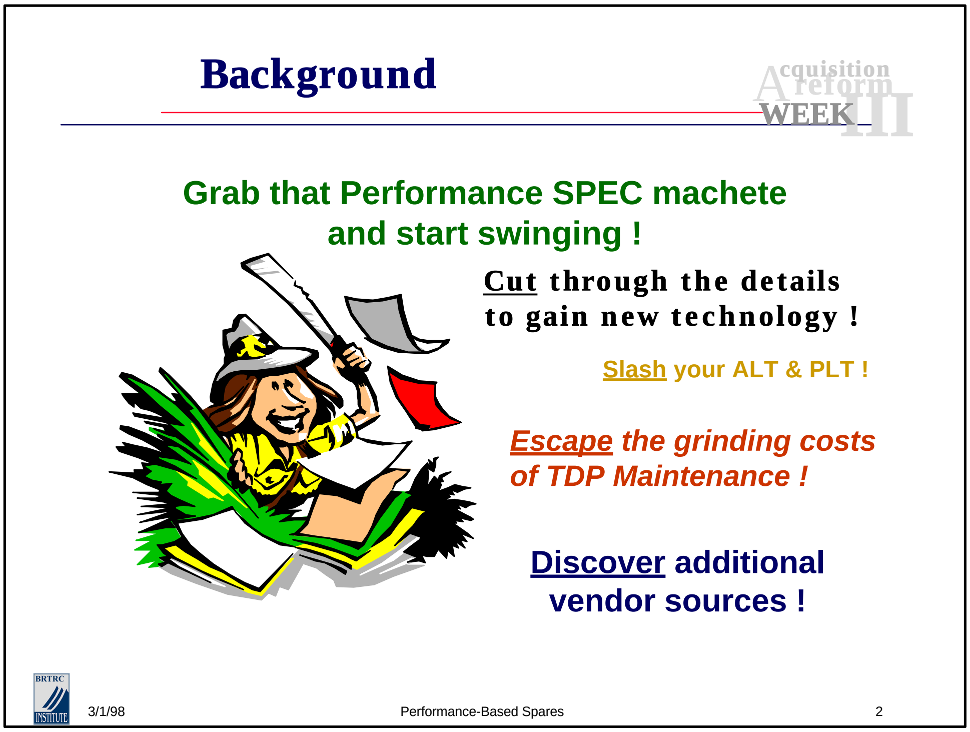


DoD is faced with a shrinking budget, a shrinking vendor base, and the continued challenge of sustaining an aging fleet of capital equipment and systems.

It's clear that we need to turn things around, access a wider base of commercial vendor sources, and modernize our equipment from the inside out with new tech parts while harnessing the power of re-engineered process.

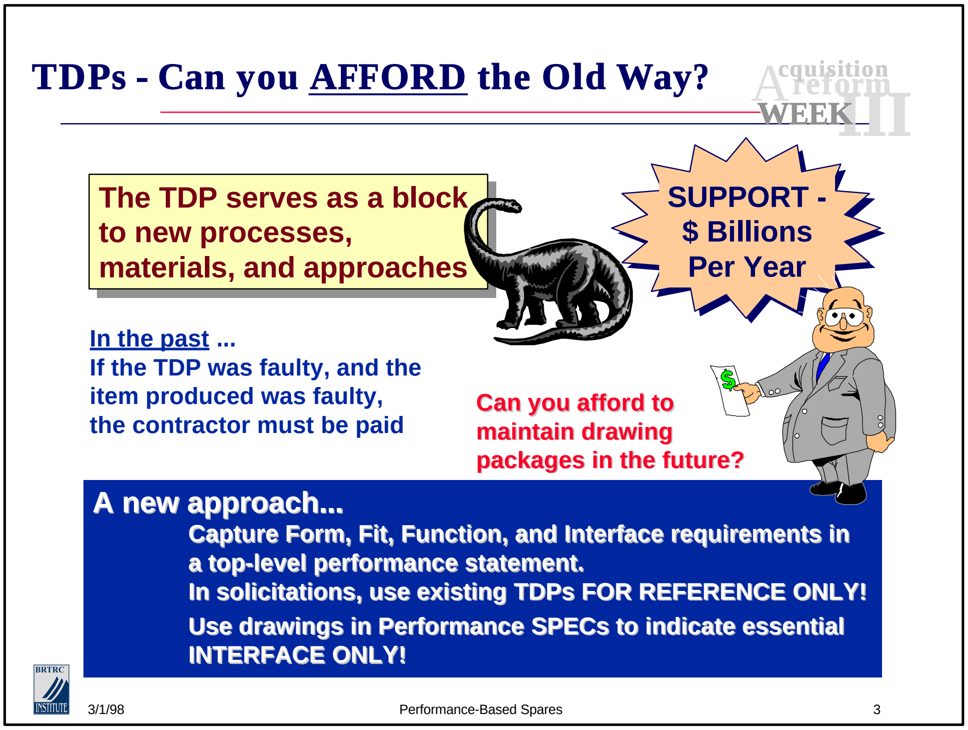
All this while reducing our administrative and procurement lead times.

Fortunately, all the various acquisition reforms provide us some tools and processes to use while we machete our way through the red tape.

We're here to examine one process, Performance-based Spares contracting, and learn how to apply it in our daily routine.

Contracting with Performance SPECs is not only a good idea -- it is mandated <u>for new products</u> by DoD policy which was spelled out in a June 1994 memorandum from then Secretary of Defense William J. Perry.

For information purposes, various DoD agencies are also establishing approaches to analyze their Technical Data Packages <u>for fielded products</u> to select candidates to modify to a performance base. Some may require a business case analysis depending upon the dollar amount of the requirement.

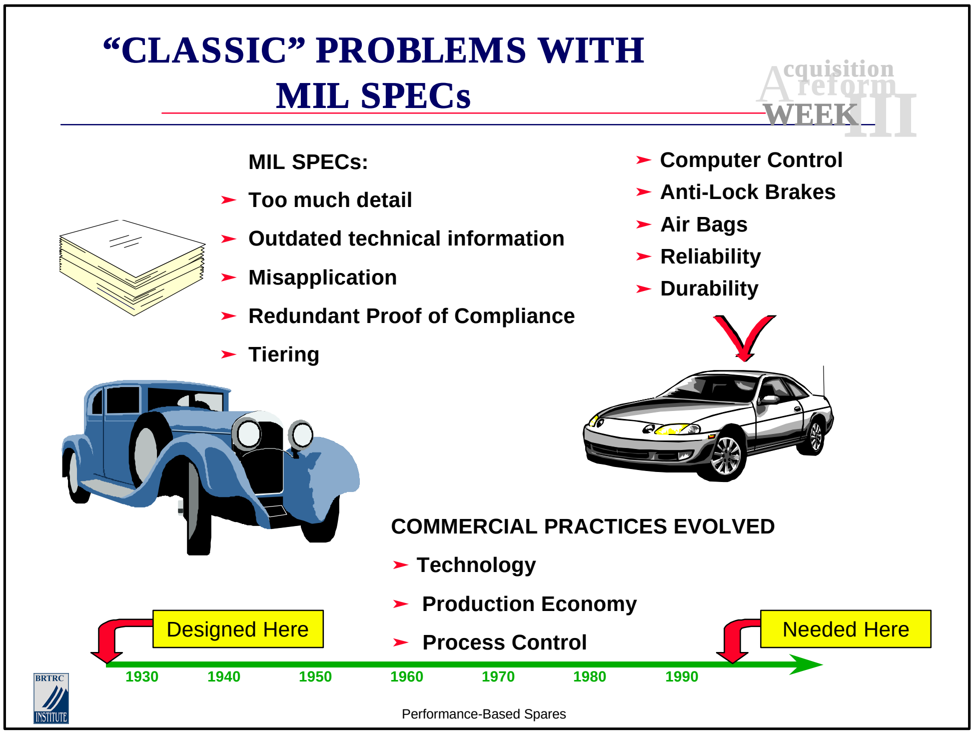


The current method of procuring most of the inventory of sustainment items - spares, replacement parts, consumables, et al - is with a Build-to-Print Technical Data Package, a TDP. This process has also been called "Build-to-Print" because the winning vendor simply used the Government detailed specification and drawings to produce parts that were "identical" to parts already in our supply bins.

The theory was appealing -- but the reality is not. TDPs contain very high levels of detail, telling a vendor what materials to use, and how to produce and test the product. Rarely can any TDP be used "as is", because each vendor's manufacturing processes, equipment, facilities, personnel, and make/buy mix vary, even when making the "same" product. The Government finds itself with an enormous technical and administrative burden, approving the myriad of changes needed to "fit" a TDP to the winning vendor's capabilities.

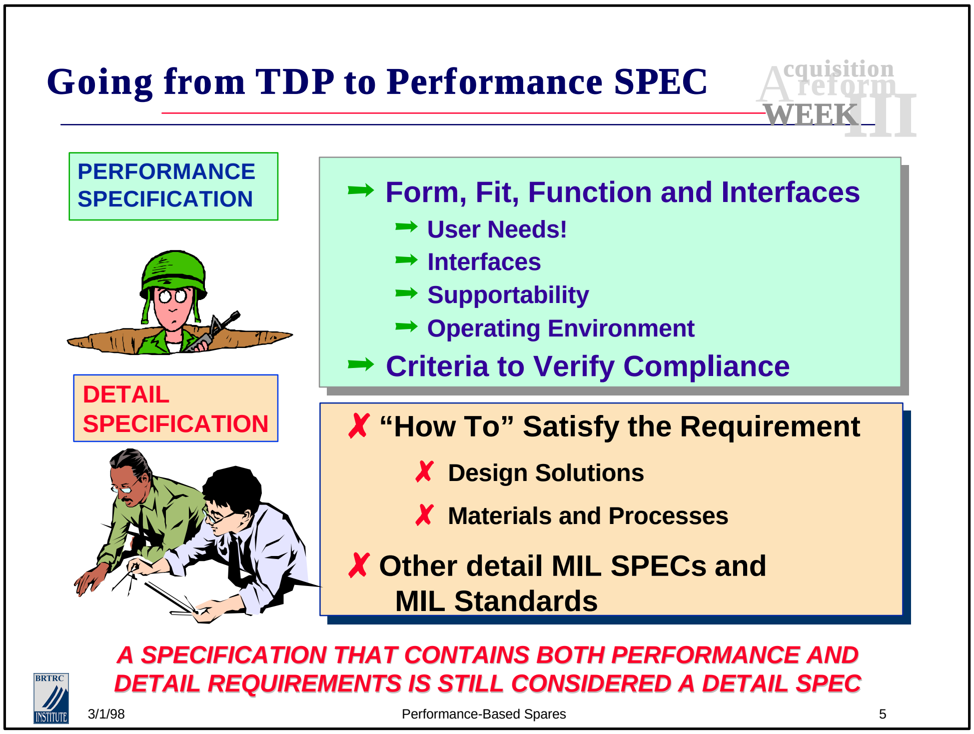
By taking a different approach, capturing the spare's essential functions and interfaces in performance-based requirements, you can open the door to buying the next generation of spare - whether it is a one for one replacement for the spare no longer built by industry or it is actually both replacement and improvement over the old spare (the idea behind Modernization through Spares).

The real power to economically introduce timely technology breakthroughs to DoD rests with you - the Logistics Support and Sustainment community. Let's look at what using Performance SPECs in Spares procurement can do for you….



This slide illustrates some of the obvious, classical problems with military specs. They normally provide too much detail and the information in the spec also tends to be, or will become very quickly, outdated. The overuse of MILSPECs also hamstrings the Government's ability to incorporate new technologies, processes and practices - the very same ones that naturally evolve over time in the commercial marketplace.

The slide also illustrates some of the more obvious technological improvements in the automobile industry as a result of its being free to adopt and incorporate current, state of the art practices and processes.



TDP's, detailed specifications, and performance specifications are all used to describe items and spares. They contain information about the performance and testing of items. TDPs and Detail SPECs have also included design and manufacturing information and directions.

We need to open up our TDP and determine what information in it needs to be categorized as Requirements and what needs to be categorized as Information Only. In a large percentage of cases it will be desirable to convert to a performance specification.

A Performance Specification defines the functional or operational requirement or the need for a spare along with a description of methods to verify that spare's performance.

It SHOULD describe the item's operating environment and interface requirements to assure form, fit, and function can be quantitatively described and verified. It SHOULD define the necessary level of interchangeability with items in inventory.

The Performance SPEC SHOULD NOT describe HOW TO design the solution or materials to be used. We want design concepts, materials or parts to be used, and manufacturing procedures to be left to industry's prerogative.

Detail Requirements Example

Materials

The surface treatment of exposed aluminum shall be chemical film per MIL-C-5541 or cadmium plate followed by clear irridite or dichromate and finished with one coat of epoxy paint primer and one coat gray epoxy paint, color 36440 per FED - SPEC-595.

Mixed Requirements

The hose shall be non-metallic, single fabric braid reinforcement with an oil and mildew resistant textile braid cover. It shall be compatible with fuel, oil, air, and water, and shall withstand pressures up to 200 PSI.

Tests as Requirements

The 5.56 mm cartridge shall not release more than one bubble of air when subjected to a positive internal pressure of 7.5 pounds per square inch for 30 seconds minimum.

The pressure indicator shall be subjected to a temperature of 85º ± 5ºC for 2 hours then the face of the cover glass shall be immediately immersed in an ice bath for 3 minutes. There shall be no evidence of moisture or oil fog inside the cover glass.

Performance-Based Spares

These examples come from existing Government detailed specifications. They are representative of the features that either make a specification detailed or useless. They contain “how to” design, materials, and manufacturing processes -- NONE of which should appear in a performance specification. Also, tests are not requirements and should not appear in the requirements portion of the specification. There is a place in the specification for tests. That section is called, “verification.”

Good Performance Requirements

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PERFORMANCE	The grenade shall ignite and emit a continuous smoke cloud under pressure within 15 seconds after the fuse is activated. The smoke cloud shall be emitted under pressure for at least 50 seconds, but no more than 90 seconds.
INTERFACE	The heater shall operate on 24 to 28 volt DC current and shall not exceed 15 amps at 28 volts.
RELIABILITY	The Smoke Generator Set shall have a Mean Time Between Operational Mission Failures of 50 hours with an 80% confidence level.
PALATABILITY	The cheese spread shall possess a flavor and odor of a medium cured cheddar cheese with a slight butter flavor note.
PHYSICAL CHARACTERISTICS	The weight of the actuator shall be no greater than 4 pounds

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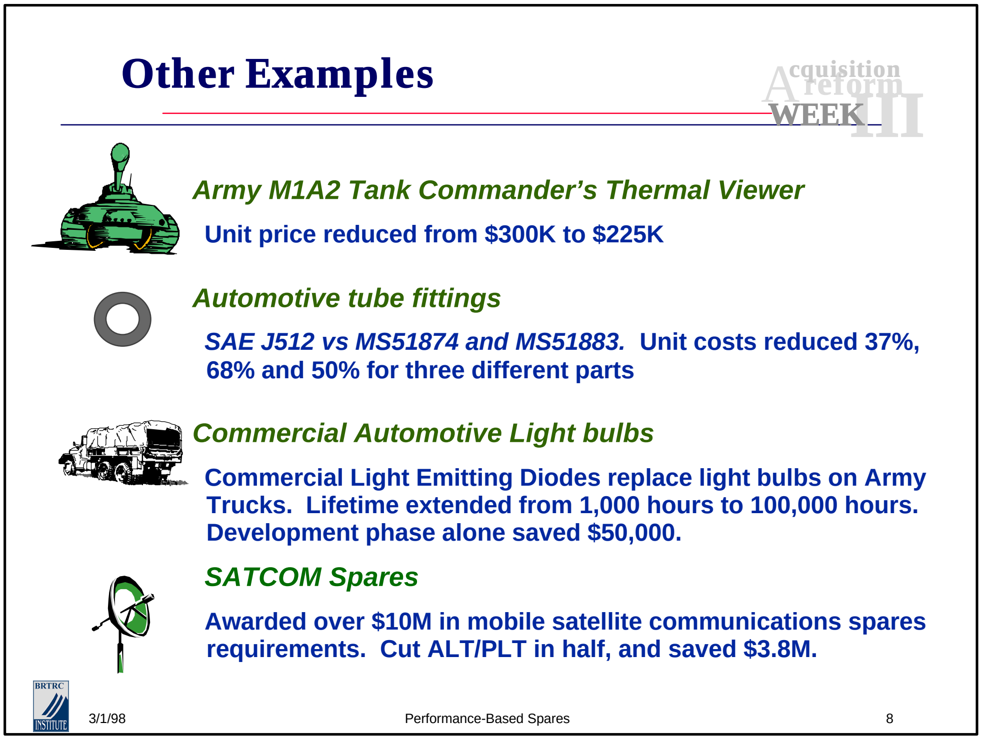
Performance-Based Spares

These examples do not specify design, materials or manufacturing processes. However, you can be as specific as needed to identify an interface.

Notice that just about all of these performance requirements are expressed in quantitative terms… that can be readily verified to ensure each requirement has been satisfied.

Performance of the smoke grenade could be verified with a demonstration timed with a stopwatch. Readily available test laboratory equipment, like volt meters and scales, can be used in verifying the examples of interfaces and physical characteristics.

One example given, Palatability, is a more subjective requirement. After all, what tastes good to several people may not agree with a few other people. Still, scientific statistical-based verifications, like blind group taste tests, can be applied for a fair unbiased verification that the Palatability requirement has been met.



Here are just a few examples to illustrate that we are beginning to apply these lessons to spares procurements.

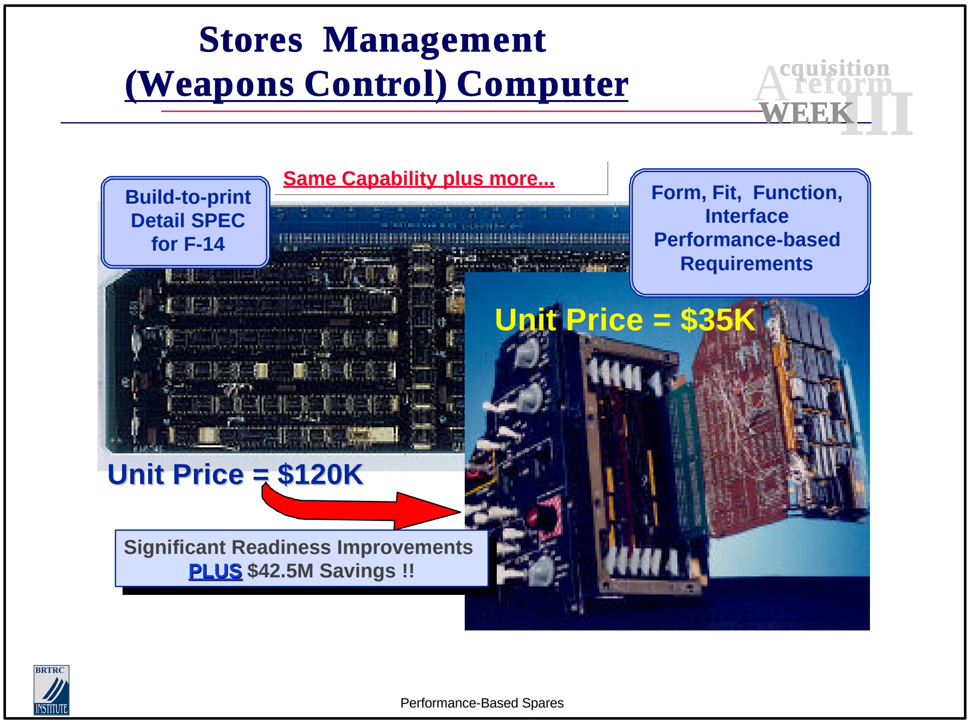
The first three are Army Tank-Automotive & Armaments Command (TACOM) examples:

- tube fittings - shift from detail MIL SPEC to Non-Government Standards, to allow commercial item procurements.

- light bulbs - result of an Operations & Support Cost Reduction (OSCR) Program effort. TDPs for various indicator lights have been done, preserving unique military vehicle interfaces while allowing commercial technology to be used.

The SATCOM example is from CECOM. It illustrates a combination of Acquisition Reform initiatives including Performance Specifications which affect both ALT & PLT; Bundling which is taking various components of like technology and grouping them so the package is larger and thus more attractive to industry; and, using Multiyear contracts which reduces ALT of having to process lots of one-year contracts, plus PLT in that the contractor has some threshold annual lot for which to plan.

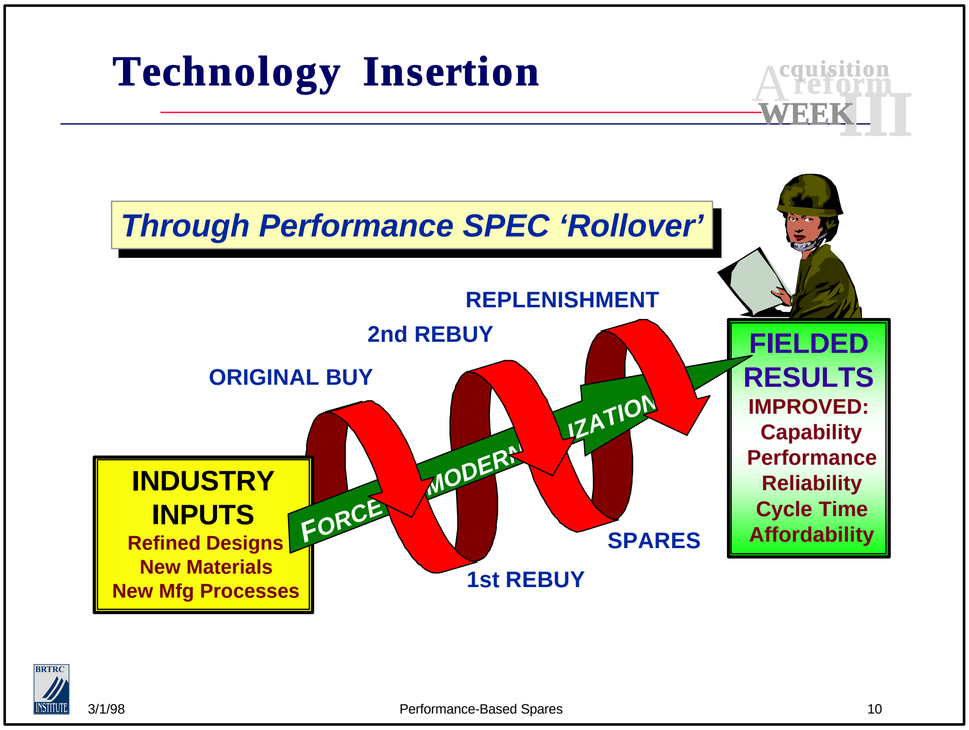
The point is: we are being very successful making the switch to performance specs, and it is both possible and necessary to change across the board.



Here's an example of the savings that can be achieved when using Performance-based requirements.

The original $120K computer board design, captured in the detailed TDP, called for parts (computer chips) that were no longer manufactured, and for manufacturing processes that were no longer used by state-of-the-art electronics industry. The Navy needed more computer boards for its F-14's, and industry could no longer produce the original design of anything approaching a reasonable cost.

The computer board's performance and Form, Fit, Function and Interface requirements were captured in a top-level product description. The result is a new computer board, that performs at least as well as the old board, conforms to all the required interfaces, costs only one third the cost of the original board. Plus, by allowing industry to introduce modern parts and new manufacturing processes, the board's reliability and durability increased dramatically. Verification of the new board was done using a standard Navy tester, just like the testers used by fleet mechanics on aircraft carriers.



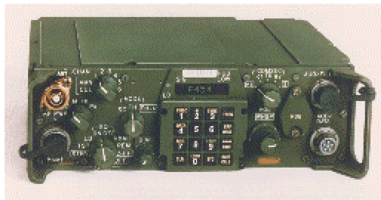
Let's see what happens when technology advancement and industry's creativity are disconnected from the dictates of the specification....

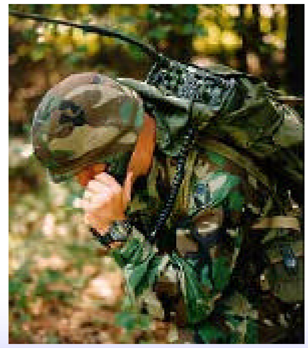
- When the first buy occurs you get industry's best approach, best materials and processes, as well as a reasonable cost through a Best Value award.

- When it's time for the first rebuy, industry has evolved with time. More vendors are aware of the new ways DoD is doing business, resulting in the potential for a wider population of vendors, newer technology, the possibility of a higher level of performance, exceeding the original requirements. Needless to say, after this procurement, it's time to upgrade the spec because the government will see better performance is achievable at a reasonable cost.

- This process keeps repeating with time simply because the government unleashed industry from that single source of design direction represented by the TDP and detailed SPEC.

Technology Insertion in Action





- **SINCGARS Radio**
  - **Integrated Team and Performance SPEC**
  - **1st Buy: $11K each, MTBF 800 hours**
  - **2d Buy: $5.5K each, MTBF >2000 hours**
  - **Progress Continues**

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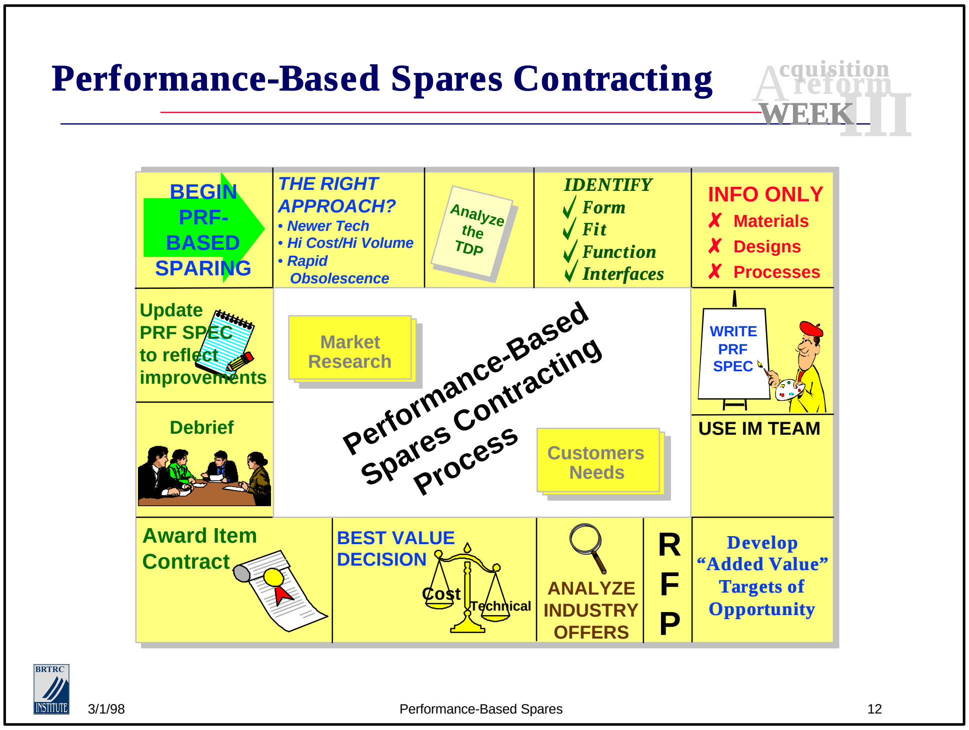
Here is an actual illustration of technology insertion in action - - drawn from SINCGAR's early experiences.

SINCGARs were already out in the field and more were needed. The IPT members putting the procurement together knew that electronics technology breakthroughs come fast and furiously. Rather than tell industry how to build them a SINCGARs, they put out a performance SPEC giving Form, Fit, Function and Interface performance requirements. And here's what they got….

On the first buy, they got radios that cost $11K each, with 800 hours mean time between failures.

On the second buy, using the same performance SPEC, they got radios that were less than half the cost per unit, and with a reliability of over 2000 hours mean time between failure.

And now, with electronics technology turning out more capability within smaller physical components… the SINCGARs team is looking at packing more capability -- like GPS-- into the existing dimensions of the radio. This gives the soldier more capability, in a single unit, without adding to the weight or amount of hardware he's got to carry on his back.



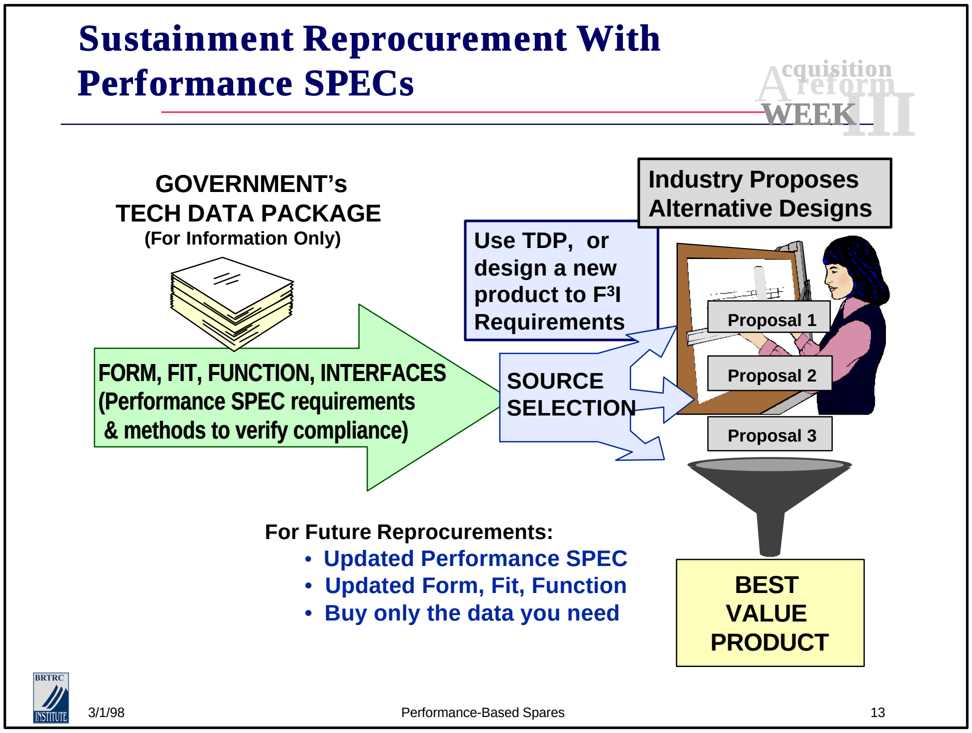
This is the spares acquisition roadmap using a Performance-based Spares Contracting process.

First, we make sure this process is the right approach. Does commercial industry supply this spare? Has our Market Research told us that new technology may be available or that the components in our current spare are obsolete? Are we going through a high volume of this spare? Is it a high cost item that might be manufactured less expensively? If the answer to any of these questions is "yes", then proceed…

We'll look at some typical TDP content and distinguish between the real performance requirements and the current single-point design solution information. We'll look at the input various members of the Item Management team can give and how to effectively use that information to our advantage.

And, we'll take a quick look at Best Value contracting as it applies to our spares procurement.

Later on, you will have an opportunity to work through an exercise that will demonstrate some of the principles we're talking about in this seminar.

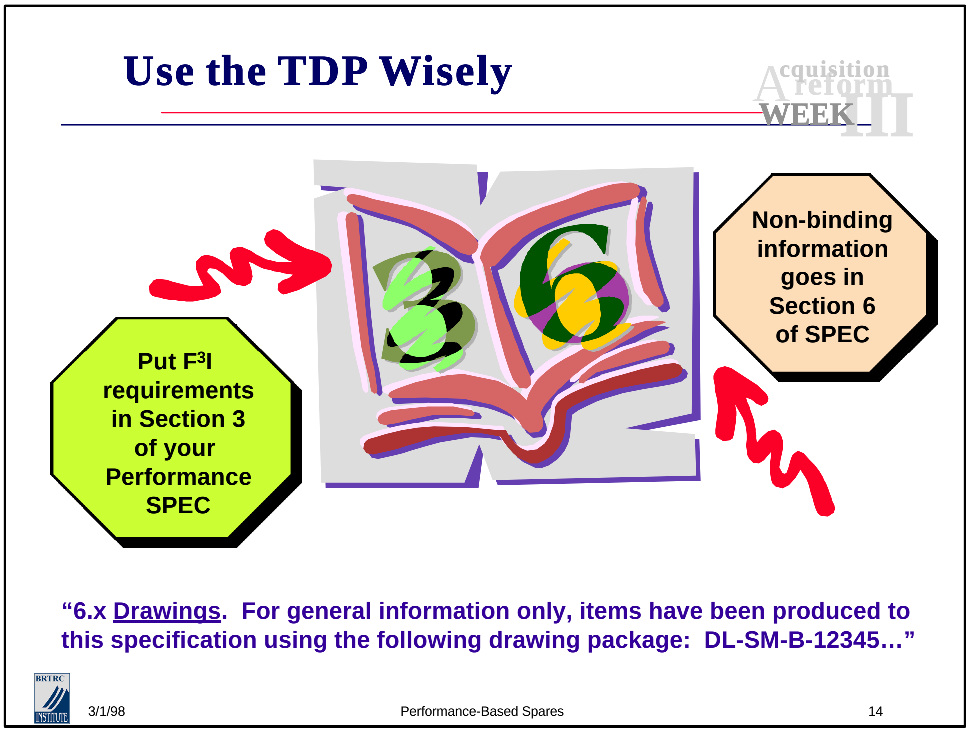


Here's the new way to do sustainment -- a Performance SPEC, with the TDP provided for information only. Performance SPECs allow for new options in the reprocurement of items.

When the government goes out with an RFP, the Performance SPEC for that package will contain all the Form, Fit, Function and Interface F^3I requirements which allow compatibility with existing items in the supply system. The existing Technical Data Package is provided by the government for reference purposes only.

The government may also include "hints" to the offerors of desirable (but not mandatory) improvements in item performance or supportability. These are Added Value "Targets of Opportunity" to allow an enterprising vendor to offer an item that's a cut above the competition. If you are in a sole source situation, you could use a cost-sharing or Value Engineering incentive to encourage desired improvements.
With this information in hand, vendors have the freedom to respond with either the existing design from the TDP or an alternative design which MUST STILL MEET the F^3I requirements of the original item without exception.

Newer technology, updated materials, less costly manufacturing processes can be offered. Once in the supply system, the improved item's performance and F^3I becomes the baseline and is incorporated into subsequent Performance SPECs.



Okay, so you have written about all your spare part's Form, Fit, Function and Interface requirements and you have put them in Section 3 of your Performance SPEC.

Now, how do we tell industry that we have a TDP that we have used in the past to buy this spare?? You can put some words like these (see slide) in Section 6, the Notes section, of your SPEC.

Remember, your previous detail design TDP is now "for information only". You have to be very careful to pull all the bona fide Form, Fit, Function, and Interface requirements up into your Section 3 Requirements part of your new Performance SPEC.

Identify Added Value “Targets of Opportunity”

Use your Item Management Team!

Get input from Logistics Engineers, Users, & Item Managers

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Don’t try to do Performance-based Spares Contracting all by yourself! The people on your Item Management Team are there to help. Each one brings input from a different viewpoint -- technical, financial, field user concerns.

Getting input from industry is very useful -- through Market Research, draft RFPs, or Pre-Solicitation conferences.

You can use all this input to envision an improved spare part -- one that meets all your requirements and then goes a bit further! Your IM Team’s inputs and research will help identify which improvements could give DoD the best pay-off…..the best value. These features become the Added Value “Targets of Opportunity”. Some examples are:

- Increased reliability
- Easier maintainability
- Increased performance
- Contractor supply system/delivery
- Affordability

Assemble your RFP

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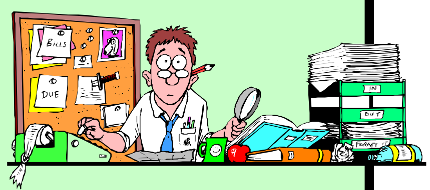
- **Section C**
  - **PRF SPEC (**F^3I **Reqts & Verification methods)**
- **Section J**
  - **TDP for Info Only**
- **Section L**
  - **Instructions to Offerors**
    - Ask for Past Performance data
    - Ask for Sample of K'r F^3I Data
    - Allow Multiple Offers
- **Section M**
  - **Evaluation Factors**
    - Cost/Non-Cost "Targets of Opportunity"



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You have analyzed your TDP, extracted essential requirements, and written them into a Performance SPEC. You used Section 6 in your SPEC to let industry know the current TDP is good for information. Now, package everything into a Request for Proposal.

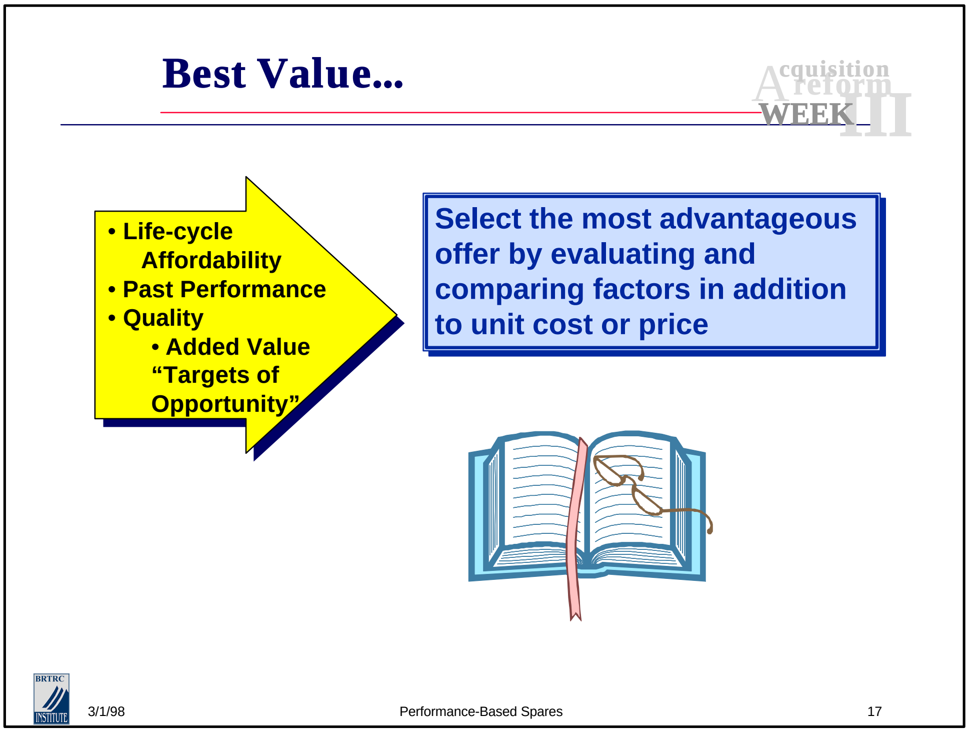
The requirements documents go into RFP Section C. The INFO documents, like your TDP, go into Section J.

Your procurement people will be working on Sections L and M with you. In Section L, you tell industry what Added Value "Targets of Opportunity" you'd like to see in spare parts offered, by putting such a list in the "Instructions to Offerors" section of your RFP and by tailoring contract incentive clauses to further focus industry's attention on those "Targets of Opportunity".

Also in Section L, ask vendors to provide Past Performance data. This is how vendors demonstrate, with verifiable information, their knowledge and responsiveness. Past performance can be from previous Government buys or similar commercial efforts. This equalizes the playing field for companies with no previous Government history.

Let industry know that they can submit more than one proposal - just in case one company has multiple possible solutions for your Spare Part need.

Section M lets industry know how you will evaluate their proposals. It should communicate your priorities across cost, schedule, and technical parameters. Under Technical, make sure you put emphasis on your Added Value Targets.



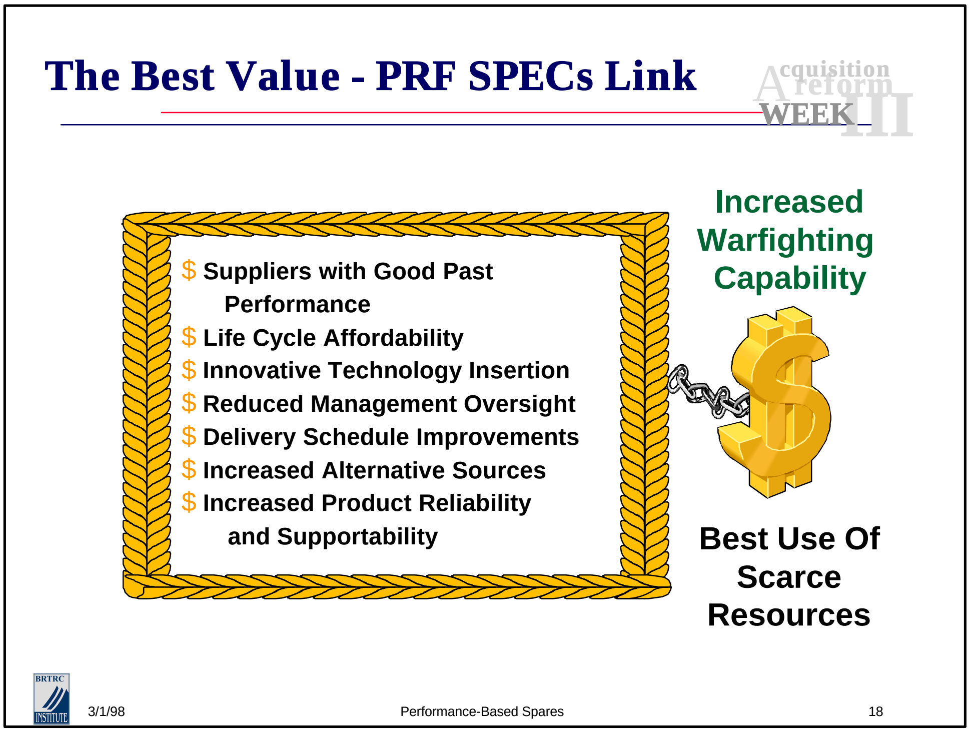
So far, we have focused on how to put the Performance SPEC together and package it with the rest of the Request for Proposal.

Now, we are entering the point in the buying process when the procurement and contracting people traditionally used to take over. That is not the case anymore!

Our Item Management Team concept lets the contracting people contribute early…and lets the logistics and technical people continue their very active involvement in the actual procurement.

With the Best Value process, trade-offs are encouraged and expected. No longer must we always award to the lowest cost offeror. We must make solid evaluations of the proposals. It is entirely possible, for the Spare Part Solution we choose, to be more expensive than the lowest cost offer. This is allowed provided the solution gives us some non-cost benefits or values that make it worth the higher cost. Examples are higher reliability, proven track record of timely delivery, or some feature that could cut maintenance time in half.

As smart consumers, in our personal lives, we make Best Value selections all the time. Now DoD policy makers are saying "Please use this approach on behalf of DoD, too!"

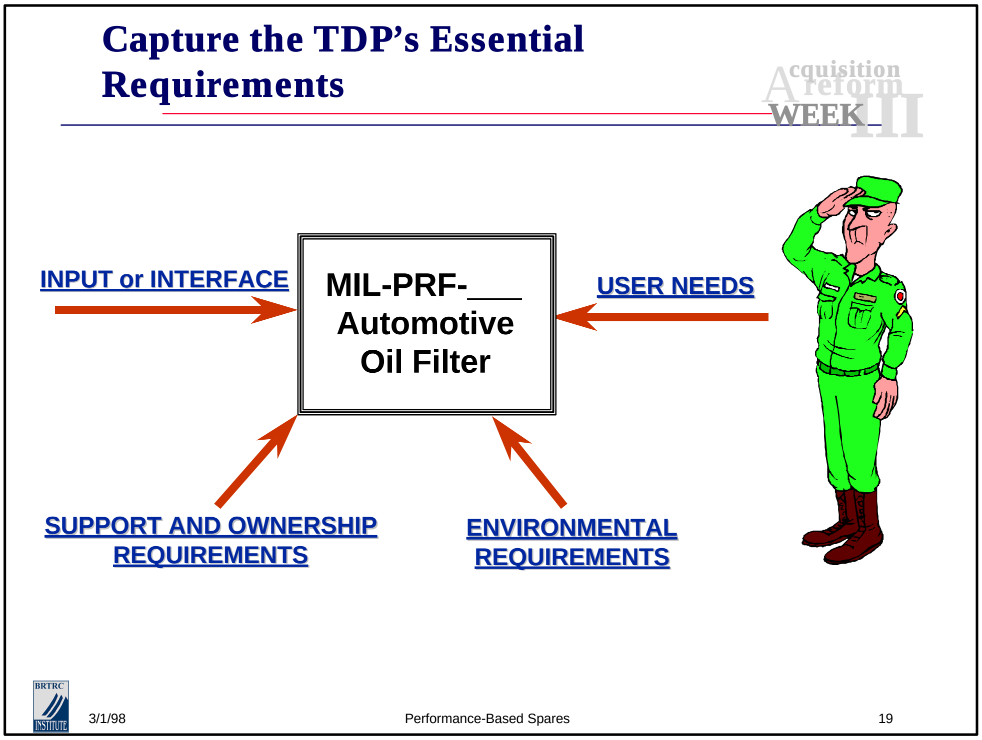


Performance SPECs and Trade-off contracting for best value are linked together. Both are needed so DoD can get the biggest bang for every buck.

Through Performance-based Spares Contracting, with every single spares and piece part procurement we make, we can open the door to:

- increased vendor sources
- more modern technology - with its increased reliability and capability
- in a fiscally sensible process.

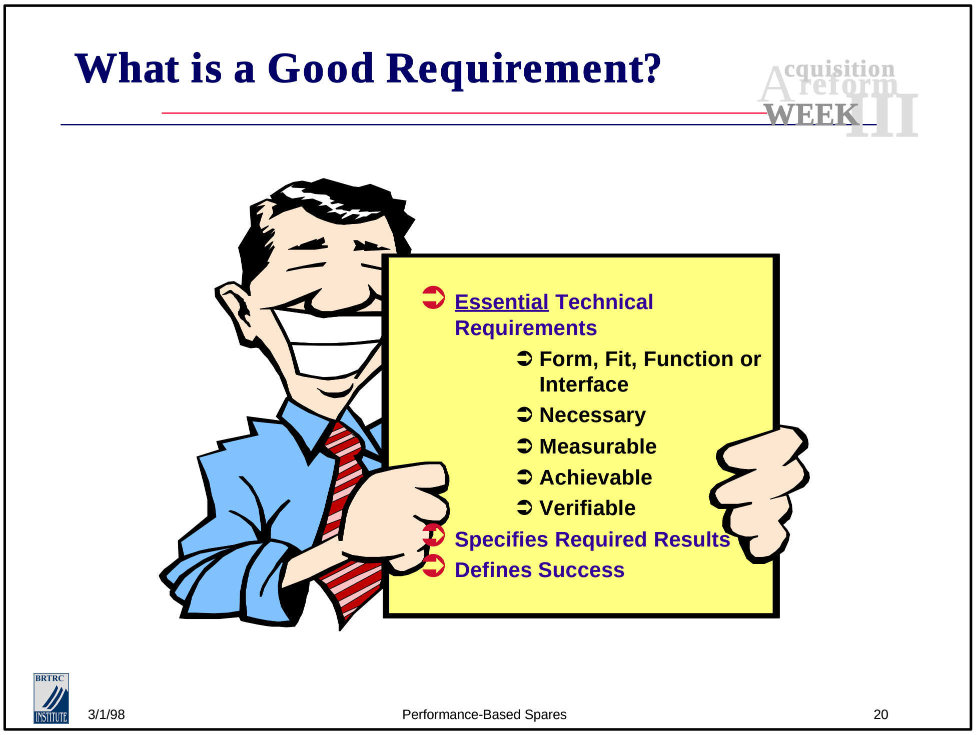
Some of the information presented may be new to you. It helps to work through new ideas… so let's practice what we have just heard...



This is a tool we developed to help capture the Form, Fit, Function, and Interface requirements buried in our detailed SPECs and drawing packages. It is the same tool you will be using in the exercise that follows this seminar. As you can see, there are four categories:

- User Needs: The operational functions that people in the field expect the equipment, including spares, to do for them each time the equipment is used;
- Interfaces: The points where our spare part fits with other pieces of a system. Interfaces can be physical dimensions, like nuts fitting onto bolts, or functional dimensions, like electrical voltages,.
- Support & Ownership: The life cycle features we require in our spares, like reliability, durability, safety… features that we need over the entire life of the spare part;
- Environmental Requirements: Where we will use this spare part … perhaps in a standard office environment with controlled temperature and humidity… or perhaps in the harsh environment of the battlefield, in the wind, dust, freezing rain, etc.

Let's work with this tool using a simple example - - the Oil Filter for your car.



These are the essential components of a good performance requirement. You could use this as a checklist! After you have developed your Performance SPEC Model, use these points to double check your work. You don't want to miss essential requirements, nor do you want to pay for one twice!

- Form, Fit - Minimum and/or maximum physical dimensions - inches, pounds, etc.
- Interface - Describe the meeting points where your spare part and the rest of the system come together.
- Function - the actions, the purposes, of the spare part

When you get ready to actually write Performance SPECs or Statements, you can also use this checklist. Keep these next charts in mind when you are working on your own TDPs. Describe your spare part without leading the reader to a design solution. The desired/required results should be plainly apparent.

Phrase your requirements in terms that are quantifiable and measurable. Remember, if something really is a requirement, then you need some proof that the requirement is fulfilled.

Performance Requirements - User Needs

<u>Solids removal</u>. "The filter shall remove solids contaminants 25 microns and larger from engine lubricating oil."

A user need, ***Filter Oil***, identified as a ***functional*** requirement.

With a Detail SPEC or Drawing Package, the vendor is restricted to one solution based on the specified materials, construction, and design conformance

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Here's an example of how to write about a User Need in performance terms. We emphasize the function or action that the item must perform. In this case, the item must be able to filter out the particles of dirt and metal chips that engine oil will pick up when circulating in our engine.

Note that we don't say HOW the filtering must be done, only that the function is required.

Vendors are free to offer us a variety of filtration methods. All of the successful solutions will have to pass our Verification Test for filtration.

Beyond that, we will then choose the best one for us, much as we do at the Auto Parts store when we buy the parts needed to change our car's oil.

Performance Requirements - Interface

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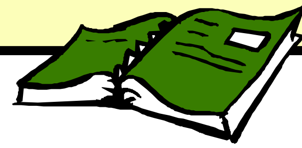
Mounting. "The filter shall interface correctly with the engine mounting depicted in Drawing 246-13579.



An interface requirement whose ***physical dimensions and layout*** are defined by a ***drawing***.

With a Detail SPEC or Drawing Package, the vendor is required to comply with all details on the drawing (materials, manufacturing processes, designs…) not just the physical dimensions.

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This is a way of phrasing an Interface Requirement. We all know the old saying that "a picture is worth a 1,000 words". That can be very true when we try to define a physical interface requirement.

So here we have pulled out the drawing in our Oil Filter TDP that illustrates how the filter physically mounts to the engine. The ONLY information on that drawing that becomes a requirement is that any oil filter proposed by a vendor must be capable of physically mounting on our engine, using the same mounting that oil filters in current inventory use.

Any other Information on that drawing, such as materials, or manufacturing processes, are not requirements with which the vendor must comply. The vendor is welcome to use such information, but he will not be held to it.

Performance Requirements - Support & Ownership

<u>Service Life</u>. "The filter shall meet minimum filtration requirements for not less than 5,000 vehicle miles."

Service Life identified as a ***measurable functional*** requirement, with performance growth potential.

With a Detail SPEC or Drawing Package, Service Life is an outcome of the materials, construction, and design conformance with no room for performance growth.

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In the past, Detail SPECs attempted to ensure or "buy" Service Life by dictating a design, materials and processes to be used, or simply reacting to failures by turning "lessons learned" into new design requirements.

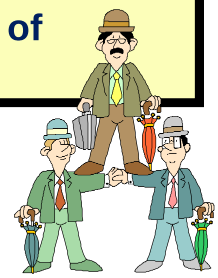
When writing in performance terms, Service Life is called out directly as a performance requirement. It is then up to the vendor to respond with a product that can be shown to meet this reliability level.

This illustrates how a Performance SPEC can drive life cycle costs down. If a vendor provided a 10,000 mile filter, it is now possible to award them a contract using "best value" criteria. When we prove that the solution works, and that 10,000 miles of filtering is achievable, then we can update our Performance SPEC to show this now confirmed industry capability.

When we go out for the next rebuy of our Oil Filter spare, we should use 10,000 miles as the minimum Service Life performance requirement.

Performance Requirements - Support & Ownership

<u>Interchangeability</u>. "The filter shall be functionally and physically interchangeable with respect to like replacement parts of the same type and design, regardless of manufacturer."



Interchangeability identified as a ***functional*** requirement.

With a Detail SPEC or Drawing Package, Interchangeability is an outcome of the materials, construction, and design conformance.

3/1/98 Performance-Based Spares 24

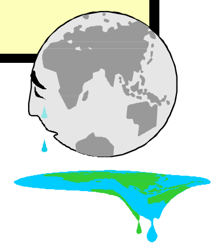
Depending on the particular item you are procuring, Interchangeability may be a critically needed feature! In the case of High Volume (or High Usage) spares or consumables that you might have to procure from multiple vendors, any new items you buy need to fit right into the supply pipeline along with the items already on hand in the supply bins.

You need to carefully determine to just how low a level of Interchangeability you need to go. Stay at as high a level as you can, trying to avoid getting down into piece part levels, unless you absolutely have to.

Since you cannot call out the entire TDP to get the outcome of Interchangeability, you need to specify Interchangeability as a performance requirement if it truly is a requirement.

Performance Requirements - Environment

<u>Vibration</u>. "The filter shall operate without degradation in performance after exposure to ground vehicle vibrations."



An environmental factor, ***vibration***, identified as a ***functional*** requirement.

With a Detail SPEC or Drawing Package, the product's ability to withstand its typical operating and storage environments is an outcome of the materials, construction, and design conformance.

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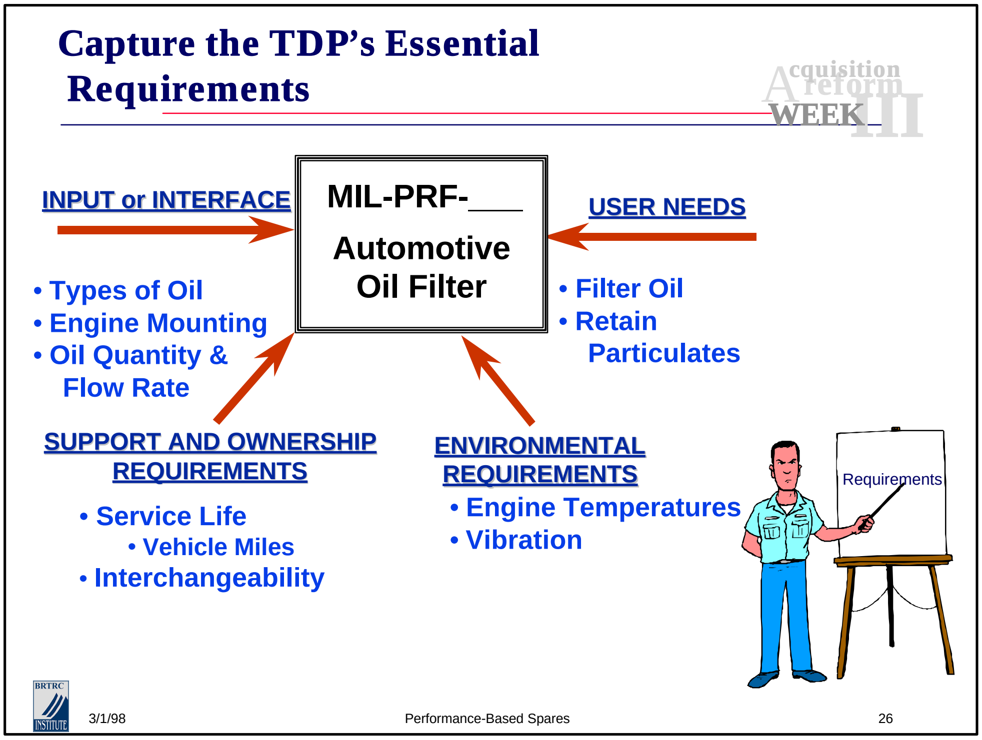
An item's ability to function within its typical operating environment is designed into the item. When invoking a TDP, we received all those abilities that were designed into the item. But we also became restricted to only that unique design.

There will be some up front work involved in detailing all the environmental requirements that our Performance-based Spares must meet. But the benefits that come with allowing vendors to offer various designs have more than compensated for our up front efforts.



Here we have the five requirements we just discussed, plus a few more, for our Automotive oil filter. We have placed each one of them in one of four categories: User Needs, Interfaces, Support & Ownership, and Environmental.

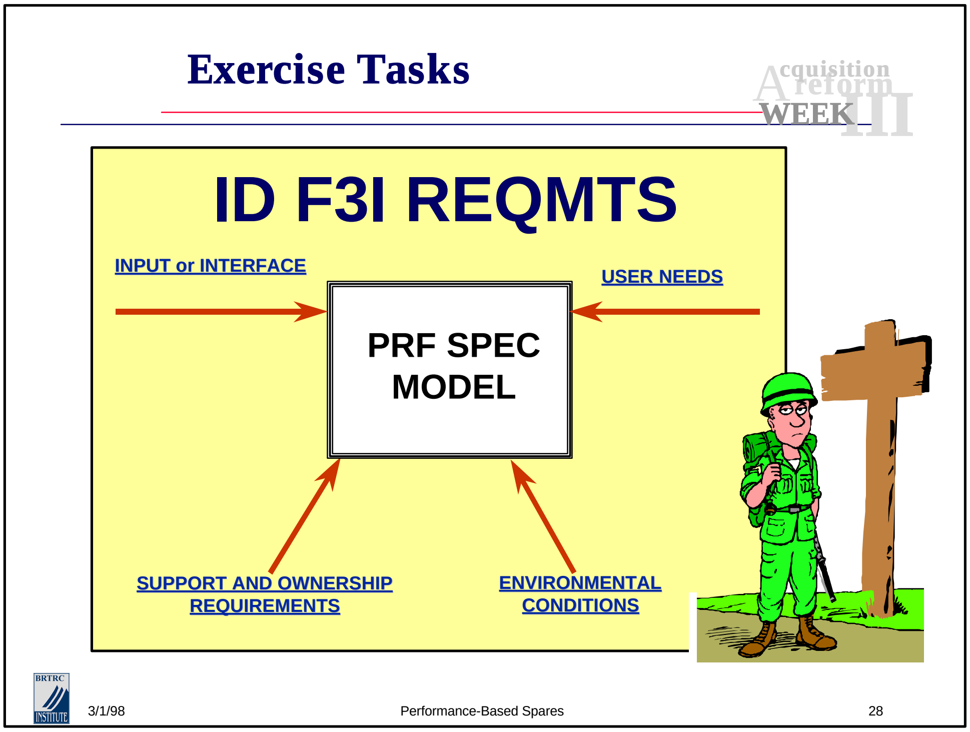
- By going through this categorization, we have just built a top-level outline of our Requirements (Section 3) part of our Performance SPEC. Each of these bullets listed on our model will become paragraphs in the Requirements section of our Performance SPEC.

- Now, we will use a chart similar to this one to build a Performance model for the product in our exercise - the 300 amp generator used in the Army's Bradley Fighting Vehicle. At the end of the exercise, your workgroup will be asked to brief your completed Performance model to other workgroups doing this exercise.

Discussion/ Exercise Tasks

Performance-Based Spares Procurement

Acquisition Reform Week III



1. Using detailed generator specification - Detail Spec entitled "Military Specification" - (which is provided), your Item Management Team will identify all essential Form, Fit, Function, and Interface requirements for the 300 amp generator. You will also categorize these F3I requirements into one of the four categories: User Needs, Interfaces, Environmental requirements, and Support & Ownership requirements. Write each F3I requirement that your team identifies on the Performance SPEC Model under the appropriate category title.

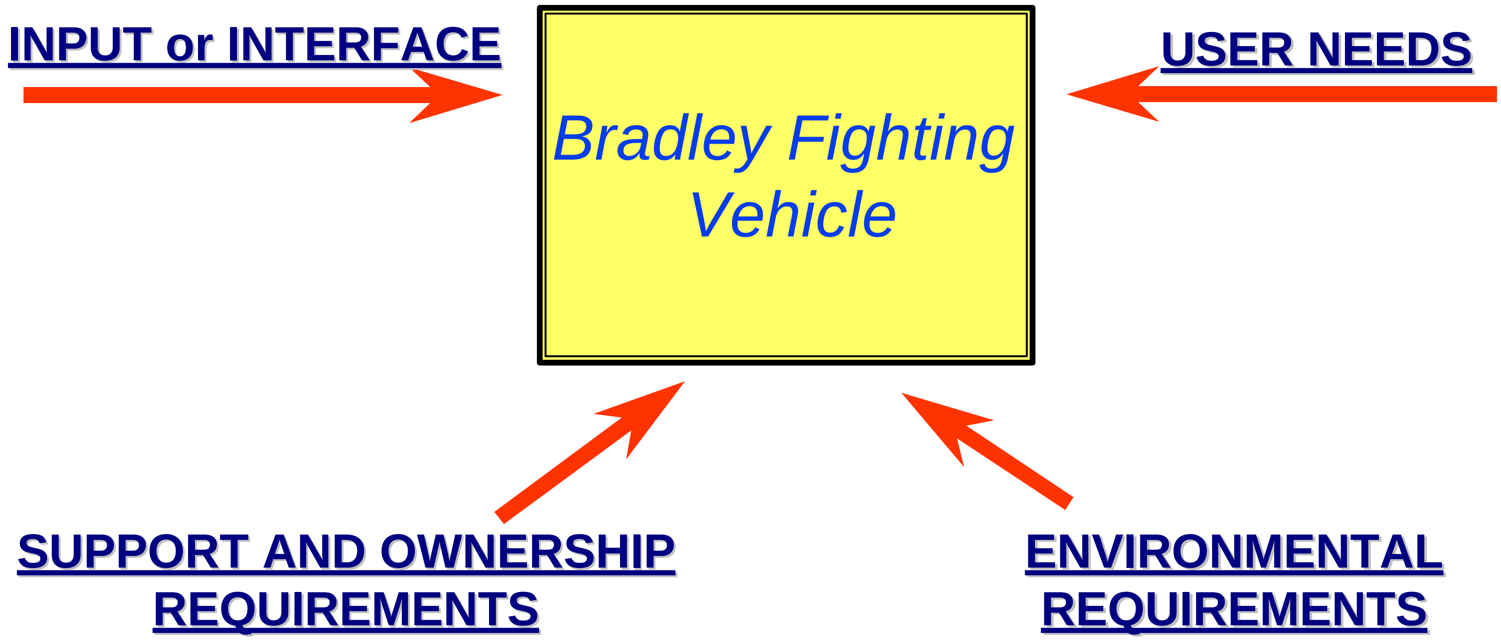
2. Logically, the next step would be for your team to review the generator drawings to determine what data helps define Performance requirements and aids in telling industry what functions and interfaces the generator must meet. The remaining information would then be considered "General Info Only", because it is applicable only to the unique design of the current generator.

3. A final step would be to use the background information and market research data to identify desirable improvements to existing generator that would provide added value in terms of performance, reliability, or other life cycle issues important to operations and maintenance forces.

****** For purposes of this exercise, you will focus only on completing the Performance SPEC Model (paragraph 1 above). Your team will be asked to report out using the chart that follows. ******

PERFORMANCE SPEC MODEL

MIL-PRF- 62743
Generator, Engine Accessory, 300 amp



INCH-POUND

MIL-G-62743(AT)
7 September 1992

MILITARY SPECIFICATION

GENERATOR, ENGINE ACCESSORY, 300 AMP

This specification is approved for use by US Army Tank-Automotive Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the performance, test, manufacture and acceptance requirements for the 300 ampere direct current engine accessory generator, part number 19207-12351001-2, herein referred to as the generator (see 6.6.1).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

P-D-220	- Detergent, General Purpose.

MILITARY

MIL-S-19500 JANTX	- Semiconductor Devices, General Specification for.

STANDARDS

MILITARY

MIL-STD-461A Notice 4	- Electromagnetic Interference Characteristics Requirements for Equipment, Subsystems and Systems.
MIL-STD-2000	- Standard Requirements for Soldered Electrical and Electronic Assembly

2.1.2 Other Government documents, drawings, and publications. The following other Government documents , drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS		
	19207-12351001	- Generator, 300 Amp DC
ARMY REGULATIONS		
	AR 611-201	- Enlisted Career MGT Fields and Military Occupational Specialties (MOS 63G10).

3. REQUIREMENTS

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3.2 Materials. Materials shall be in accordance with the drawings, parts lists, and other documents specified on Drawing 19207-12351001. Materials shall be uniform in quality and free from defects or imperfections.

3.3 Design and construction. The design and construction of the generator shall be as specified herein and in accordance with Drawing 19207-12351001.

3.3.1 Weight. Weight of the generator shall be not greater than 85 pounds.

3.3.2 Dimensions. Dimensions of the generator shall be in accordance with Drawing 19207-12351001.

3.3.3 Maintainability requirements. Generator design shall accommodate repair capability at the lowest possible level of the Army Maintenance Operations using the Direct Support level as a goal. Consideration must be given to the available MOS 63G10 (AR 611-201) skills, tools, and test measurement and diagnostic equipment (TMDE). Requirement for, or introduction of, new TMDE is forbidden.

3.3.4 Spline alignment . Provision shall be made for means to rotate shaft for spline alignment.

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3.3.6 Soldering. Soldering of electrical connections shall be in accordance with MIL-STD-2000, except solder used on power rectifier and output stud connections shall have a melting temperature not less than 200^0 Celsius (392 degrees Fahrenheit (^{0}F)).

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3.3.8 Bearings. The generator shall have sealed bearings. The generator shall require no lubrication.

3.3.9 Guard. The generator shall be provided with a guard to protect personnel from the rotating parts.

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3.3.11 Power transistor. The power transistor controlling the field current of the generator shall conform to MIL-S-19500 JANTX.

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3.3.13 Temperature-compensated regulator. The generator shall be equipped with a temperature-compensated regulator, the function of which is to provide the optimum voltage to recharge and maintain the vehicle batteries.

3.4 Proctective coating.

3.4.1 Exterior finish. Exterior surfaces of the generator shall be painted as specified on Drawing 19207-12351001.

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3.5 Performance.

3.5.1 Generator output current (see 4.6.1.1). Minimum generator output current shall be as
specified in table I. The generator output shall be enabled by the application of 18.0 to 30.0 vdc on the excitation contact and disabled by removal of this voltage. The current required to enable the generator shall be not greater than 1 amp. For each of the tests listed in table I, the minimum output voltage shall be 26.0 vdc.

TABLE I. Generator output current.

Test#	Minimum Rated continuous output current (amps) 1/	Maximum speed (rpm)	Generator air inlet Temp. (^{0}F)	Minimum test duration (hr)
1	120	2325	200^0 to 210^0F	1
2	300	7500	75^0 to 100^0F	1
3	260	7500	225^0 to 235^0F	1

1/ Rated continuous output current shall be produced at maximum speed. It may be produced at any lower speed.

NOTE: Maximum current is defined herein as current equivalent to or greater than the rated continuous output current under the condition specified in table I.

3.5.2 Generator output voltage settings

3.5.3 Voltage regulation

3.5.4 Voltage ripple

3.5.5 Voltage transients

3.5.6 Overvoltage protection. The generator shall have automatic shutdown to prevent a steady-state overvoltage condition in case of generator control failure. Voltage excursion normal to the system shall not cause generator shutdown. The overvoltage protection shall be built into the removable generator regulator subassembly.

3.5.7 Isolated output terminal (see 4.6.1.7). The generator shall be equipped with an output terminal that is isolated from the generator B+ terminal to operate generator indicator lights and vehicle accessories.

3.5.8 Efficiency (see 4.6.1.8). Minimum generator efficiency above 100 amps in the 3000 to 7000 rpm range shall be 60 percent. Torque required to drive the generator at any speed up to 8500 rpm shall not exceed 30 foot-pounds.

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3.5.11 Endurance (see 4.6.1.11). The generator shall be capable of the following 600 hour test without performance degradation of any requirements specified in 3.5.1 through 3.5.10 and without any maintenance or malfunction.

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3.5.14 Parallel operation (see 4.6.1.14). The generator shall be capable of parallel operation
with generators conforming to this specification and Drawing 19207-12351001 without additional control or protective devices.

3.6 Environmental conditions.

3.6.1 Low temperature. The generator shall demonstrate no performance degradation and show no evidence of damage when stored and operated at -60^{0}F.

3.6.2 High temperature. The generator shall demonstrate no performance degradation and show no evidence of damage when stored and operated at 230^{0}F.

3.6.3 Shock

3.6.4 Vibration

3.6.5 Humidity

3.6.6 Salt fog

3.6.7 Steam and waterjet cleaning. The generator shall demonstrate no performance degradation and shall show no evidence of damage or deterioration following a steam and waterjet cleaning process which uses a cleaner conforming to P-D-220. There shall be no entry of water or moisture to modules sealed against water or moisture.

3.6.8 Fungus

3.6.9 Dust. The generator shall demonstrate no catastrophic failure after 288 hours of operation in an extreme dust environment of silica flour with a suspended dust concentration of 5 ounces per cubic foot (oz/ft^3). The silica four composition shall be as specified in paragraph 4.6.2.9 The dust test shall consist of 12 24-hour cycles. For 20 hours, the generator shall operate at a speed of 6000 $\pm$ 200 rpm with an output of 50 $\pm$ 5 amps and an air inlet temperature of 200 $\pm$ 10^0F. During the remaining 4 hours, the generator shall operate without electrical load and shall cool down to 100 $\pm$ 25^0F.

3.7 Product marking. Part identification shall be applied as specified on drawing 19207-12351001.

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3.9 Interchangeability. To provide for interchangeability, the generator shall conform to this specification and Drawing 19207-12351001. All subassemblies/components selected in design shall make maximum use of military standard and commercially available materials. Use of non-standard materials shall be only in those applications where there is no standard military or commercial material available. Non-standard materials shall be approved by the Government prior to use.

3.10 Electromagnetic interference. Conducted and radiated emissions from the generator shall not exceed the CE07 and RE05 levels specified in MIL-STD-461.

4. QUALITY ASSURANCE.

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5. PACKAGING

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6. NOTES

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6.1 Intended use. Generators manufactured under this specification are intended for use on military tracked vehicles in the Bradlely Fighting Vehicle and Fighting Vehicle System Carrier families.

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6.6 Definitions.

6.6.1 Generator. The engine accessory generator is the prime source of 28 vdc electrical energy for military vehicles. Generator output is in accordance with table I acquisition

reform

Week

III

Solutions

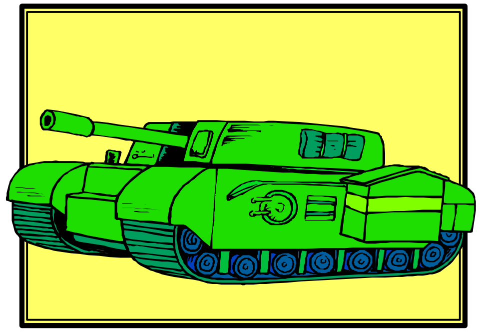
Performance-Based Spares Procurement

PERFORMANCE SPEC MODEL SOLUTION

MIL-PRF- 62743
Generator, Engine Accessory, 300 amp

INPUT or INTERFACE

- Ops in BFV (MLRS, BFV, C2V)
- External Dimensions: - Overall envelope; fit into engine compartment in allocated space
- Engine interfaces (Splined shaft, Studs, Face, Power Take-Off Unit)
- Cable Connectors/Locations
- Weight (≤ 85 lbs)
- Max Torque ≤ 30 Ft-Lbs
- Electromagnetic Interference
- Isolated Output Terminal



USER NEEDS

- 300 amperes at 28 volts DC
- Efficiency 60%@ 3000 - 7000 RPM
- Voltage regulation
  - Voltage Ripple
  - Voltage Transients
  - Overvoltage Protection
  - Excitation Circuit
- Charge vehicle batteries
- Operate vehicle electrical systems
- Parallel operations

SUPPORT AND OWNERSHIP REQUIREMENTS

- Reliability
- Safety
- Maintainability
  - Test Measurement & Diagnostic Equipment
- Reparability
- Identification

ENVIRONMENTAL REQUIREMENTS

- Temperature
- Humidity
- Shock
- Vibration
- Salt fog/spray
- Dust
- Fungus
- Steam/Waterjet Cleaning